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ABSTRACT

Documented shortages of secondary mathematics and science teachers have occurred for over a decade. Yet a program developed to enable individuals with academic preparation in mathematics and/or science to become teachers encountered difficulty in placing the students in paid teaching internships. Although benefits to school districts for participating in the program included salary savings and assistance with their teacher induction programs, not many districts have shown interest in participating in the program. This report contains the project data for this study. Information provided includes data for two sessions of the program, with six students completing each session. Student major, gender, date of degree, and teaching field is provided. Also given is university faculty information for the courses, mentors used, and collaborating schools. Program characteristics discussed include program content, instructional processes, features of the collaboration with schools, and of work within the university, intended outcomes, and products. Implementation requirements are provided by cost, grants, time and training, equipment, and personnel. A summation of ideal, acceptable, and unacceptable organizational arrangements is given. (MVL)

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Practice Profile
Graduate of Certification Program
for Secondary Teachers
Texas A&M University



Instructional Research
Laboratory
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& Instruction

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Graduate of Certification Program
for Secondary Teachers
Texas A&M University

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Practice Profile
for the Project

Graduate Certification Program for Secondary Teachers
Texas A&M University - College Station, Texas

I. PROJECT DEMOGRAPHICS

A. Study Characteristics

Since the program was established as a post-baccalaureate program to certify secondary school teachers in mathematics and science common characteristics among the candidates in cohort 1 and 2 included baccalaureate degrees at a minimum with an area of emphasis in one of the sciences and/or mathematics. Cohort 1 (1986-87) contained six individuals with the following backgrounds.

Cohort I	<u>degree-date</u>	<u>major</u>	<u>gender</u>	<u>teaching field (s)</u>
Intern 1	B.S. - 86	physics	f	physics, mathematics
2	B.S. - 74	chemistry	m	science composite
3	B.S. - 73	geology	m	science composite, earth science
4	B.S. - 85	chemical engineering	f	physical science, chemistry, mathematics
5	B.S. - 85	chemistry	m	chemistry, physical science
6	B.S. - 57 M.S. - 69	chemical engineering	m	chemistry, mathematics, physical sciences

All of these individuals have completed the requirements for certification, while the first 5 interns on the list satisfied all requirements for an M.Ed. degree in Curriculum and Instruction.

Cohort II (1987-1988) contained seven individuals at the outset in June 1987, with the following characteristics.

Cohort II	<u>degree-date</u>	<u>major</u>	<u>gender</u>	<u>teacher field(s)</u>
Intern 1	B.S. - 86	computer science	m	mathematics, computer science
2	B.S. - 81	geology	f	earth science, science composite
3	M.S. - 83	geology	m	earth science, science composite
4	B.S. - 82	biology	m	biology science composite
5	B.S. - 85	biology	f	biology science composite
6	B.S. - 83	computer science	f	mathematics, computer science
7	B.S. - 83	geology	f	earth science, composite science

Intern 7 dropped out of the program at the conclusion of the fall semester, 1987.

Comparing the two groups reveals a shift to more recent graduates and a shift in major. However, this latter shift was due to the employment needs of the participating school districts.

B. Teacher Characteristics

Nine faculty members in Educational Curriculum and Instruction have taught courses completed by the interns.

These individuals include:

<u>Faculty</u>	<u>courses</u>
David Armstrong	Curriculum Development
Julia V. Clark	Science in the Middle and Secondary Schools
Carole Crain	University Supervisor - Cohort I
Jon Denton	Methods and Theory of Teaching
	Seminar in Secondary Education
	Practicum Methods I & II
Jesus Garcia	Cultural Foundations of Education
Robert Kansky	Mathematics in Middle and Senior High School

John Morris	Classroom Management
Tom Savage	Analysis of Teaching Behavior
James Zuhn	University Supervisor - Cohort II

Seven classroom teachers have served as mentors to the interns during Cohort 2. One mentor, Mr (Musik) has served as mentor to interns in both Cohorts 1 and 2. Unfortunately the names of other mentor teachers for Cohort 1 have not been located.

<u>Mentor</u>	<u>School</u>	<u>District</u>
Mickey Musik	Westfield High School	Spring ISD
Marsha Burns	Tomball High School	Tomball ISD
Jo Fritts	Iola High School	Iola ISD
Jean Rogerson	McCullough High School	Conroe ISD
Judith Long	Washington Jr. High	Conroe ISD
David Archer	Oakridge High School	Conroe ISD
Linda Buchanan	Knox Jr. High	Conroe ISD

C. School/District Characteristics

Four school districts have actively participated in this program since its inception by employing interns. These districts are:

<u>Districts</u>	<u>Size (ADA)</u>	<u>Number of Interns</u>	<u>Cohort Groups</u>
Conroe ISD	20,987	6	1, 2
Iola ISD	282	1	2
Spring ISD	15,547	4	1, 2
Tomball ISD	4,168	2	1, 2

Three of these school districts Conroe, Spring, Tomball are located within 30 miles of Houston, while the remaining district (Iola) is located approximately 20 miles from the university. Location of the districts has been an important variable in this program, for two reasons. First, school

districts located near Houston have experienced declining enrollments with the down turn in the petroleum industry. This economic phenomenon has certainly affected the number of intern placements in the participating districts as well as efforts to recruit other Houston area districts to participate. Second, in order to contain program expenses, especially those associated with intern supervision, efforts were made to place interns in neighboring school districts (Conroe, Spring, Tomball) or near the university. This latter policy has enabled the program to provide extensive supervision at a modest cost.

D. Program Characteristics.

1. Program Content

This project certifies secondary teachers in mathematics, physics, chemistry, physical science, or geology through two summer sessions and one full academic year. During the first summer session, interns learn about instructional design, classroom management, and instructional resources. In schools, they observe teaching, interview school personnel, and assist teachers with instructional tasks.

During the academic year interns teach four classes a day and take courses which integrate research on teaching and instruction, emphasizing classroom practices and their theoretical rationales. They also conduct an instructional research project.

In the final summer, interns complete two of the required core courses in the traditional master's degree program. discuss their teaching experience and revise their instructional research project reports. In addition, six semester hours of electives are completed by the interns to satisfy the requirements for the masters degree.

2. Instructional Processes

The Project emphasizes a laboratory approach to teacher preparation where the intern develops thinking and analytical skills and can apply the principles of pedagogy to practical problems in the classroom. To this end, the curriculum combines content with a substantial amount of experience in the classroom. Interns progress from observing, interviewing, and assisting teachers to teaching classes themselves. They are observed frequently by university and district supervisors. They are videotaped at 4-6 week inter-

vals, and their videotapes are discussed during seminars. Their instructional research projects allow them to pursue topics of interest, emphasizing the need to be reflective and thoughtful about teaching.

3. Features of the Project's Collaboration with Schools

Participating school districts play an integral role in this program. Interns are selected through a joint screening process of the districts and the university. During the academic year interns are paid by the host district one-half the salary of a beginning teacher. They are supported and assisted in their teaching by district supervisors as well as college faculty.

An advisory council of school district personnel and college faculty guided program development. It links with participating school district programs and critiques procedures, materials and instruments used by the project.

4. Features of the Project's Work within the University

University supervisors, liaisons between participating schools and the college, teach field courses to interns. They orient interns, conduct seminars as part of the clinical experience, and evaluate interns.

The University Council on Teacher Education which advises the President and Academic Vice President of the University, periodically reviews the program.

5. Intended Outcomes

As a result of participation in this program, interns will have the requirements and demonstrated teaching abilities to be certified to teach secondary science and/or mathematics. In addition, the university will have a set of student recruitment procedures and a new curricula for preparing and certifying teachers for high need areas.

6. Products

The project's major products include 1) an intern recruitment and selection process with materials and a three-step screening procedure; 2) a curriculum and instructional process for graduate certification; and 3) a set of validated instruments to assess intern performance and their impact on student learning of curriculum.

II. IMPLEMENTATION REQUIREMENTS

A. Costs

The following table presents the cost categories and grant allocations for the program. In addition, total costs of the program are provided. However, faculty salaries are somewhat over-represented in the total cost column because other students in addition to the interns participated in the coursework. The figures for faculty salary are presented as though separate sections of courses were provided for the interns.

Table I Annual Cost of the Alternative Certification Program

Contribution			
<u>Category</u>	<u>Grant</u>	<u>University</u>	<u>Total</u>
Personnel			
faculty		44,155	44,155
Graduate Assist.	7,880		7,800
(1300 x 12 mo.			
x 50%)			
Fringe Benefits	1,014	10,597	11,611
Project Travel	5,278		5,278
Printing	1,600		1,600
General Supplies	1,447		1,447
Communications	1,000		1,000
Equipment leasing	3,600		3,600
Indirect Cost	8,261	20,801	29,062
	<u>\$30,000</u>	<u>\$75,801</u>	<u>\$105,553</u>

B. Training:

No special training is necessary for teacher education faculty to implement the curricular elements for this program. A handbook describing the role of the mentor teacher has been developed, but the success of the mentor depends primarily on the mentors' experience in working with beginning teachers during their induction years. The ability to guide, encourage, counsel and help interns depends on the mentor's view of their roles in preparing the intern for the classroom and their willingness to "teach" the interns to become competent teachers.

C. Materials/Equipment:

While course syllabi and instructional resources have been developed and acquired for this program, no special texts, computer software or computer hardware are necessary to implement this program. However, two camcorders have been leased for the program to permit the video-recording of class sessions of the interns on a monthly basis.

D. Personnel

Assuming a program with 6-12 interns, the program can be implemented with 2 faculty members and perhaps a graduate assistant.

E. Organizational Arrangements

This program has incorporated the certification requirements for the Alternative Certification plan available in Texas as well as the basic requirements for a Master of Education degree in Curriculum and Instruction. The schools participating in this program invest in the program by employing the intern and provide release time for mentor teachers to work with the intern. In other words, both the schools and university share in the ownership of the program.

Component Checklist

Ideal

Acceptable

Unacceptable

I. Maintaining Partnerships

1. Component: Successful Collaboration: Development of Ownership

a. Principals, Mentor teachers, and Univ. staff endorse and promote the program as their program. Both organizations actively engage in processes to improve program.

School officials willing to participate, but will not initiate activities or planning. University staff establishes program but checks with schools before implementation

Program belongs to university. School districts simply provide sites for interns field experience.

- | | | |
|--|---|---|
| b. Individuals communicate openly, reflecting a high level of trust. | Communication usually initiated by univ. staff, but communication is cordial. | Strained communication between institutional representatives, lack of trust, much posturing |
|--|---|---|

2. Component: Resource Sharing: Fiscal Support

School districts and university share in contributing financial resources to the program.	*University <u>or</u> school districts providing all of the financial resources for the program.
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3. Component: Rewards and Incentives

- | | | |
|--|---|---|
| a. District/university: Quality of applicants individuals with work experience in industry and excellent academic credentials form applicant pool. Individuals have expressed desire to become secondary teachers. | Individuals with quality academic credentials and expressed desire to teach in sec. schools. | Individuals with average academic credentials, looking for employment, not committed to teaching. |
| b. District/university: Extensive support and assistance provided by districts and univ. with the induction program for first year teachers. | Program conducted by either university or school with little cooperation. | No induction program for first year teachers. |
| c. Districts: Salary savings of \$3000-5000 per intern. | *No salary savings because districts do not elect to participate in program. | |
| d. Univ.: Opportunities for research in field setting. Program developed to provide videos and countless opportunities for data collection. | Opportunities for collecting data are available, but resources permit only limited data collection. | No research or evaluation data being collected. |
| e. Univ/district: Longevity of program. Both institutions continue to participate after funding ceases. | Some districts continue, some districts drop out of the program. | Program ceases. |

II Recruitment and Selection

4. Component: Student Selection

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|--|--|---|
| a. Timeline implemented to advertise, receive applications screen applicants in timely fashion and communicate progress to applicants. | Applicants do not perceive they are receiving timely feedback on progress in selection process. | Applicants receive no information from university on selection process. |
| b. Screening procedures incorporates procedures to determine whether candidate fulfills all prerequisites for certification as well as a commitment to teaching. | Screening procedures monitors whether candidate meets minimum standards for teacher certification. | All applicants are considered to be candidates for internships. |

5. Component: District Selection

- | | | |
|--|--|--|
| In order to participate in program districts <u>must</u> have an operational integrated staff-development program. | Districts are invited to participate if they will supply mentor teacher with an additional preparation period to work with the intern. | Districts are invited based on need of districts for science or math teacher without regard for staff development. |
|--|--|--|

III Instructional Content

6. Component: Structure of Pedagogy

- | | | |
|---|---|---|
| Scope and sequence of program curriculum are based on experiential content which integrates theoretical and empirically documented concepts & principles. | Curriculum based largely in either empirical, or experiential content with little or no integration between the two epistemologies. | Curriculum based solely on experiential processes. In other words curriculum is based on the assumption that "Teaching is a craft". |
|---|---|---|

7. Component: Type of Content Maps

- | | | |
|--|---|---|
| Content maps of pedagogy are organized into content taxonomies with attributes of included concepts clearly specified. | Content maps for all elements in the curriculum completed but attributes of all concepts not specified. | No maps. Content is loosely conceived as course topics. |
|--|---|---|

8. Component: Use of Content

Instructional program developed to encourage major concepts to be demonstrated at the formal level of concept attainment (Klausmeier, et al). (Can apply the concept and explain why it works).

Application of concepts expected; foster concept attainment to the class-factory level of concept attainment, (can apply the concept but cannot explain why it works.)

Concepts taught to the identity level of concept attainment. (Knowledge of terms but very limited application.)

IV Instructional Processes

9. Component: Role of Mentor-Teachers

Mentor teacher serves as role-model, counselor, compassionate critic to foster development of interns.

Mentor teacher provides advice and assistance when encouraged by university staff, but feels uncertain about her/his role.

Mentor teacher is reluctant to initiate any dialogue with intern. Waits for intern to make the first move.

10. Component: Teachers as Researcher

Interns independently develop and conduct a classroom investigation on some aspect of teaching directly linked to their professional practice.

Interns must be given a topic to investigate; unable to conceptualize a "study" on their own.

Intern does not submit a research plan, even when suggestions have been offered.

V Student Evaluation Processes

11. Component: Observation Schedules

Interns are assessed by district supervisors-TTAS assessment; univ. supervisor conducts direct observations and monthly video-tapes for subsequent self-analysis and program analysis with COS instrument.

Univ. supervisor visits and video-tapes class session; TTAS assessments are not conducted by district supervisors

No classroom observation by supervisors are recorded.

12. Component: Effects Data from Learners of Interns

Cognitive attainment data and learner perceptions of instructional practices of interns collected at the end of the school year.

*data collection not completed!

*Unacceptable program description; no acceptable category description is offered.

An application of the preceding profile descriptions was accomplished by assessing each intern placement in terms of the component descriptions. Table 2 provides a summary of this assessment, revealing the program developer's sense of the extent the program was implemented as intended.

Table 2 Intern Placement classified by level of Program
Implementation (frequency)

Component	Cohort	Classification		
		Ideal	acceptable	unacceptable
	A=86-87			
	B=87-88			
1 _a	A	5	1	-
	B	6	1	-
1 _b	A	-	6	-
	B	2	5	-
2	A	6	-	-
	B	7	-	-
3 _a	A	5	1	-
	B	-	7	-
3 _b	A	5	1	-
	B	6	1	-
3 _c	A	5	(one intern participated in non-paid in internship)	
	B	7	-	-
3 _d	A	6	-	-
	B	7	-	-
3 _e	A	6	-	-
	B	7	-	-

Component	Cohort	Ideal	acceptable	unacceptable
4 _a	A	-	6	-
	B	7	-	-
4 _b	A	-	6	-
	B	7	-	-
5	A	5	1	-
	B	5	1	1
6	A	6	-	-
	B	7	-	-
7	A	-	6	-
	B	-	7	-
8	A	6	-	-
	B	7	-	-
9	A	2	3	1
	B	2	5	-
10	A	5	-	1
	B	6	1	-
11	A	5	1	-
	B	7	-	-
12	A	5	-	1
	B	6		1

The unacceptable assessments for component 5 resulted because one intern placement was made to enable the candidate to complete the experience; judgement was suspended on whether the district could provide adequate guidance and assistance to the intern. Fortunately the intern is a mature and motivated person and has risen to the challenge. She is having a successful experience.

The unacceptable assessment for component 9 occurred during cohort A. Written guidelines for the roles and responsibilities of the mentor teacher were not available. In fact, these guidelines were not produced until summer, 1987. One of the mentor teachers simply felt uncomfortable in offering advice to an intern, because he perceived the intern to be a colleague. During Cohort B, efforts have been directed at remedying this situation, by sharing the guidelines (handbook for mentors) and encouraging the mentors to share their assessments and remediations with the university supervisor.

The explanation for the unacceptable assessment for component 10 is that one intern in Cohort A participated in a non-paid internship for one semester. This field experience did not lend itself to structuring and implementing an instructional investigation. Further, this experience did not provide a full semester of uninterrupted teaching by the intern, thus cognitive attainment data (Component 12) were not collected for this intern.

Component 12 also received an unacceptable assessment for Cohort B. This assessment occurred because one intern was asked to resign from the program at the end of the fall semester, 1987. Clearly end-of-academic year data cannot be collected from learners of this unsuccessful intern.